



BETTER Farm Walk

Farm: Kevin Nolan

Grangeford

Carlow

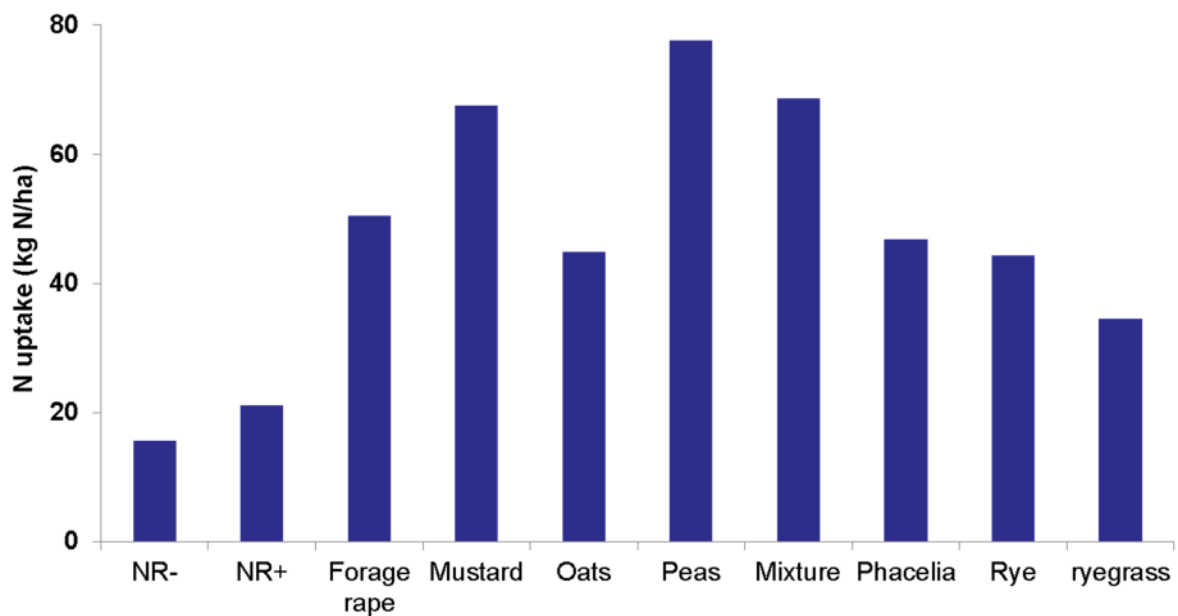
Date: 26/10/2016



Catch crops Potential Benefits

- Reduction of nutrient loss (mainly nitrate)
- Reduction of pests, diseases, weeds
- Prevention of erosion
- Improvement of organic matter
- Improvement of soil structure
- Increased nutrient supply to next crop
 - Potential to reduce fertiliser inputs
- Source of forage
- Yield benefits

Potential of catch crops to accumulate N

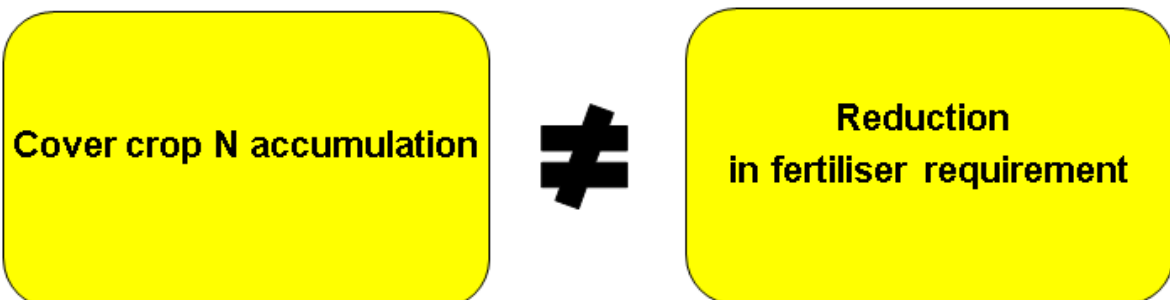


NR- = natural regeneration without cultivation

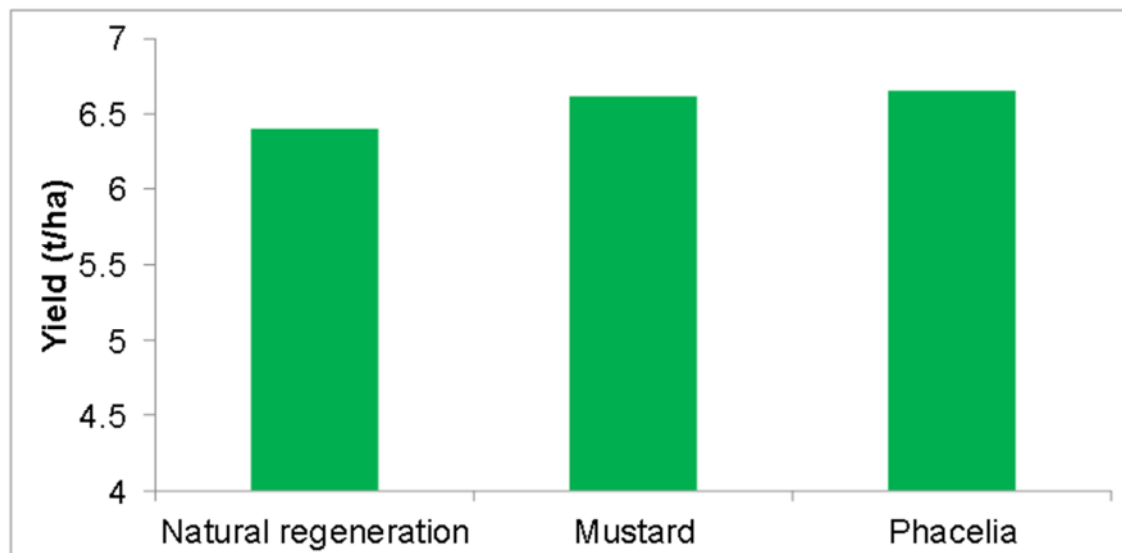
NR+ = natural regeneration with cultivation

Nitrogen availability to succeeding crop

- Many factors involved
- Somewhat comparable to organic manures
- Variable and difficult to predict
- Effect of non-legumes on fertiliser requirements small
- Little scope to reduce fertiliser N inputs



Yield Effect (Spring Barley)



Oakpark

Cover crop management

Scenario 1.

Late Sown, low biomass (little growth)

Issues	Comments	Financial (+ / -)
Soil Structure	Low level of growth means little or no effect. Erosion of soils and surface run-off more likely. Little impact in soil organic matter (may be negative).	- Maybe additional cost to rehabilitate land + May help when ploughing in spring (v no cultivation)
Nutrient Capture	Little or no nutrient capture.	- Nutrients leached need to be replaced - Lost opportunity to capture (50-80kg N/ha)
Pests	Volunteers will provide green bridge for aphids.	- Potential for BYDV infection in following cereal crop - Slug numbers may be higher + will encourage grass weed germination
Diseases	Volunteers will carry over diseases during the winter	- Risk of early infection in succeeding cereal crop - Volunteers will carry take-all
Grazing	Low covers allow sparse grazing opportunities	- Higher income may be possible with better covers
Destruction	No herbicide and spring cultivation.	+ No additional herbicide cost + No additional mechanical destruction necessary
	Burn off and spring cultivation.	- Extra cost of glyphosate (rate of 1.5 L/ha of 360g/L product) Cost €10-15/ha plus cost of application.
Overall impact	No agronomic benefits. - Poor return on money spent - Minimum spend to ensure maximising return for GLAS payment. + Potential to hold on to €50 per ha of GLAS payments?	

Scenario 2.

August sown, mustard/ fodder rape type mix with large top growth.

Issues	Comments	Financial (+/-)
Soil Structure	Large amount of top growth but may also be a lot of stems. Some rooting will help soil structure which can make land easier to cultivate. Can also make contribution to soil organic matter levels but will be slow.	+ Can help to reduce cost of cultivation in the following crops. But will be relatively small savings.
Nutrient Capture	Will capture nutrients from soil and help recycle some of these into the succeeding crop.	+ Potential to capture 50-80kg N/Ha. + P & K recycled into the soil + Legumes have the potential to fix N
Pests	Can help to smother volunteer cereals so reduce the amount of green bridge for aphids. May encourage slugs.	- Potential requirement for extra slug control.
Diseases	Can help to smother volunteers.	+ May reduce levels of infection?
Grazing	Opportunity to graze certain crops eg. fodder rape.	+ Potential income source + Grazing of covers may eliminate destruction costs
Destruction	Herbicide after Dec. 1 and spring cultivation.	- Cost of glyphosate and extra pass in the field. Rate 2.5l/ha (Cost €20-25/ha)
	Disk/top and spring cultivation.	- Cost of extra pass in the field. €30-40 per ha. - Disking has risk of making land wetter
	Direct drill followed by herbicide.	+ No destruction cost as weed control applied in the spring. - May increase herbicide cost - Volunteers will harbour pests and disease.
Overall impact	+ Potential soil structure and nutrient benefits. + Soil Organic matter improvement over time - Extra cost of destruction where no access to grazing or direct drilling will reduce financial benefits. + Potential saving of 50-80 Kgs N/Ha + Extra income from grazing may help cash flow	

Scenario 3.

August sown, tillage radish/phacelia mix lot of root biomass.

Issues	Comments	Financial (+/-)
Soil Structure	Large amount of root growth which can penetrate into the soil profile. Can help to improve soil structure and drainage.	+ Can help to reduce cost of cultivation in the following crops. But will be relatively small savings.
Nutrient Capture	Will capture nutrients from soil and recycle these into the succeeding crop.	+ Potential to capture 50-80 Kgs N/ha. + P & K recycled into the soil.
Pests	Can help to smother volunteer cereals so reduce the amount of green bridge for aphids. However may also encourage slugs.	- Potential for extra slug control. + Will compete with grass weeds.
Diseases	Can help to smother volunteers.	+ May reduce levels of infection?
Grazing	Potential to “earn” extra income.	- Bulbs may grow in succeeding spring crop which may or may not be controlled. + May reduce destruction costs
Destruction	Herbicide after Dec. 1 and spring cultivation.	- Cost of glyphosate and extra pass in the field. Rate 3.0l/Ha (Cost €25-30/Ha)
	Direct drill followed by herbicide.	+ No destruction cost as weed control applied in the spring.
Overall impact	<ul style="list-style-type: none">+ Potential soil structure and nutrient benefits.+ Soil organic matter improvement over time- Extra cost of destruction where no access to grazing or direct drilling will reduce financial benefits.+ Potential saving of 50-80 Kgs N/Ha.+ Extra income from grazing may help cash flow	

Precision Agriculture and Crop Nutrition

D Forristal: 26/10/16

- Soils and crops vary. These differences are evident both between fields and within fields yet we manage either at a field level or crop blocks.
 - Is there scope to manage more precisely?
 - Manage on the basis of variability in crops and soils?
- Challenges
 - Determining what variability to measure.
 - Measuring variability accurately, at adequate resolution.
 - Developing a management response.

Soils N, P, K and pH variability

Field sample (W pattern); 1 per 4ha, good field sampling
Spatially variable: Greater resolution required to 'map' variability

Two Approaches:

- Grid sampling:
 - 1 per hectare (100m x 100m) to 16 per hectare (25m x 25m)
 - All can produce colourful maps, but what value are the maps?
 - 3 sites: sampled at 25m x 25m: compared resolution
 - All sites varied in optimum resolution depending on the extent of the variability which is unknown at the start!
 - 1ha grid: useful on one site but not others.
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- Zone identification and sampling by Zone:
 - Yield maps; Reflectance imagery; Soil conductivity; Topography etc
 - Concentrate sampling in identified Zones.

Future:

Scanning type instruments will make analysis less expensive and will facilitate high resolution data collection.

Variable rate application of fertiliser

- Ability to vary rates on the basis of a variable rate map
- Available for all major spreaders but:
- Can be expensive
- Can be difficult to set up
- Cannot deal with sharply defined or small areas
- Relies on accuracy of VRA map and information on which its based

Crop Sensing (and Variable rate N)

- N applied at a 'field' level based on cropping history, crop type and expected yield
- Is there scope to be more precise about N: at field level or within field?
- Using crop measurement?

Crop reflectance

Captures information about crop biomass, chlorophyll and N content.

Can be measured by reflectance sensor:

- Satellite (e.g. French FarmStar)
- Drone (e.g. Airinov system)
- Tractor mounted (e.g. Yara sensor)
- Hand held (e.g. Crop Circle)

Determines status of crop but how do we use the data?

2016: Demonstrated Airinov sensor and algorithms in May

- Winter wheat crops scanned by drone mounted sensor
- Variable N maps using Airinov algorithms
- 3rd split of N varied: 2 tramlines in a number of fields
- Kevins: No discernible difference compared to flat rate
- Airinov algorithms not optimised for Irish wheat

Challenges

- Use biomass to determine yield potential?
- Use N to estimate N deficiency and shortfall?
- What is optimum timing of sensing and related N application?
- How do we integrate Sensor information with other information?
 - E.g. Weather impacting on over winter N loss
 - E.g. Soil type and possibly soil N level?
- Richie Hackett working on this area to try and determine role in Ireland
 - Complex area!

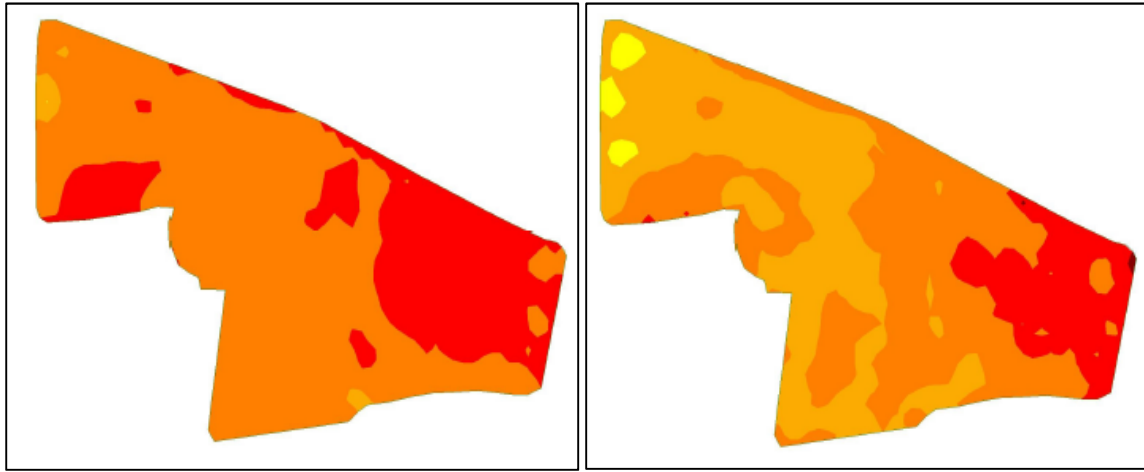
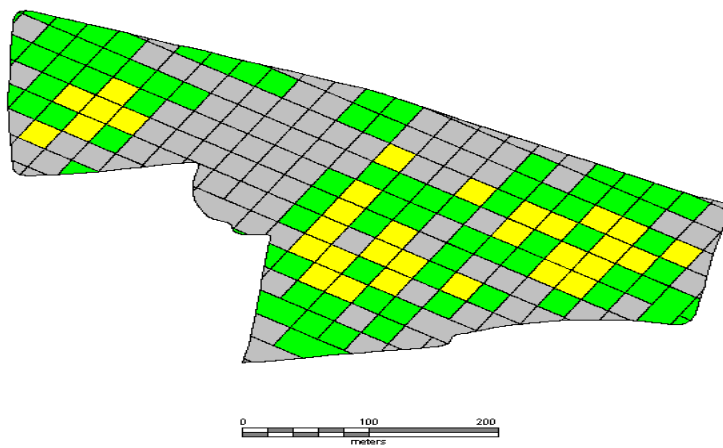


Fig 1: Electrical conductivity post harvest (shallow on LHS, Deep on RHS) : Cappoquin



Client: Collins, John
Farm: Cappoquin Estate
Field: John Collins
Crop: 2015 Oats
Name: cappoquin soil sample result:
Type: Soil Test
Date: 14/09/2015
Min: 3.4 ppm
Max: 87.0 ppm
Avg: 13.2 ppm

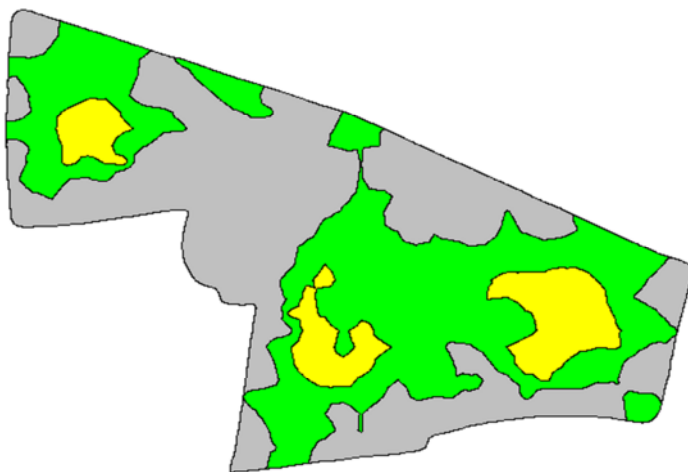
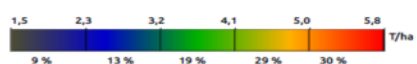
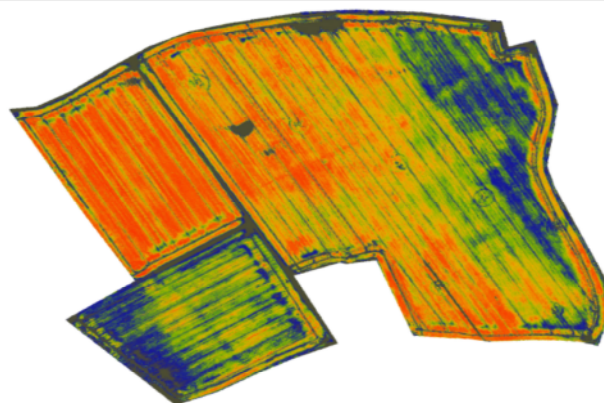


Fig 2: Soil P levels measured at 25m x 25m resolution (top) and mapped (bottom)

NITROGEN RECOMMENDATION - DRY MATTER ADJUSTED

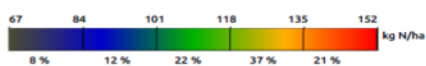
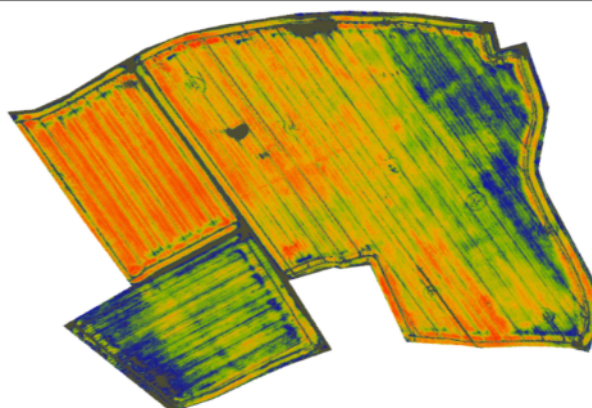


0 180 360 m



NEAR HOUSE - 58,71 HA
Flight date : 11/05/2016
Average Dry Matter : 4,1 T/ha

NITROGEN RECOMMENDATION - NITROGEN ABSORBED ADJUSTED

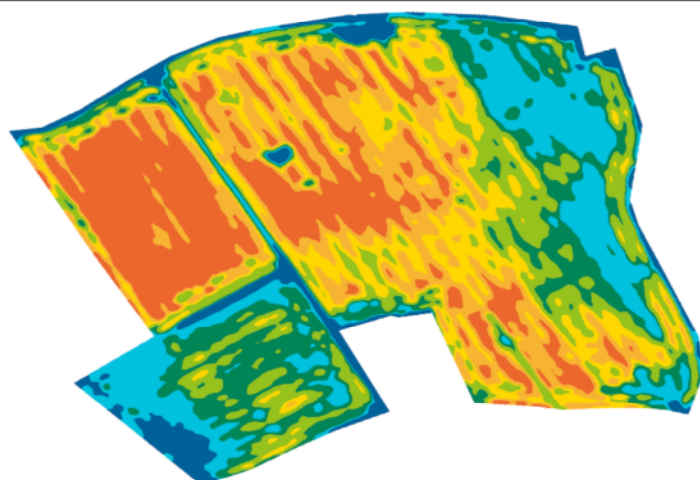


0 180 360 m



NEAR HOUSE - 58,71 HA
Flight date : 11/05/2016
Average Nitrogen Absorbed : 115 kg N/ha

NITROGEN RECOMMENDATION - DETAILED RECOMMENDATION



0 90 180 m



Flight date: 11/05/2016
Average Nitrogen Absorbed: 115 kg N/ha
Average Dry Matter: 4,1 T/ha

AVERAGE DOSE 99 KG N/HA

	Dose to apply	Surface	%
	37 kg N/ha	2,9 ha	5
	64 kg N/ha	8,8 ha	15
	83 kg N/ha	8,8 ha	15
	99 kg N/ha	8,8 ha	15
	112 kg N/ha	8,8 ha	15
	121 kg N/ha	8,8 ha	15
	131 kg N/ha	11,8 ha	20

Fig 3: Airinov sensor interpretation and recommendations

Popular weed control options in wheat and barley

Option	Products	Rate/ha	Cost €/ha	Target weeds
1. Clean fields	Dff + IPU*	0.25 L 2.5 L	25-30	AMG, speedwells, charlock, chickweed, charlock, deadnettle, vol osr. hempnettle, mayweed groundsel. Will need su + flourxypr in spring for fumitory, groundsel, beans & cleavers
2. Cleavers + fumitory	Flight + IPU	3.0 L 1-1.5 L	38-45	Charlock, chickweed, cleavers, marigold, pansy, fumitory, hempnettle, mayweed, deadnettle, poppy, speedwell AMG. Groundsel and vol. beans will need spring control. May stain tank
3. Cleavers + IPU alternative	Defy + DFF	2.0 L 0.1 L	28	Charlock, chickweed, cleavers, AMG, groundsel, deadnettle and speedwells. Will need su in spring for poppy, fumitory, mayweed
	Spitfire	0.5	14.5 +	Useful mixer for additional control of vol. beans, cleavers, chickweed

***Note; All IPU products must be used up by 30th September 2017**

Weed control in Oats

Option	Product	Rate /Ha	Cost €/ha	Target weeds
1. Autumn control	DFF	0.25	10	Chickweed, charlock, deadnettle, pansy, deadnettle, speedwell, vol osr. Follow up in spring with flourxypyr and su for cleavers, fumitory, hempnettle. Check labels
2. Cleaver control autumn	Lexus class	60 g	36	Cleavers, groundsel, poppy, fumitory. Not very residual. Limited availability
3. Spring control	SU (check label) + Fluroxypyr	Half Half	30	Can choose products depending on weed spectrum.

Sterile Brome control in Barley

Option	Product	Rate/ Ha	Cost €/Ha	Target weeds
1. Pre - emerg	Firebird + IPU	0.3 L 1.0 L	30	Will give approx.40% control of sterile brome + chickweed, mayweed, AMG, hempnettle, groundsel, speedwell. Will need a follow up of Firebird 0.3 for improved brome control. * 6 week gap restriction
2. Vigon program	Vigon Pre – emerg Firebird Post emerg	0.5 L 0.3 L	25	Claimed improved brome control on Firebird program with no time restriction. Cleavers, chickweed, pansy, groundsel, mayweed, speedwell controlled. Follow up with Firebird 0.3L for 60- 70% brome control

Sterile brome control in Wheat

Option	Product	Rate/ HA	Cost €/ha	Target weeds
1. Autumn control	Alister flex	0.8 -1.0 L	25	Charlock, cleavers, chickweed, pansy, deadnettle, fumitory, poppy, vol osr, speedwell, amg, brome. Not very persistent in autumn often used in Feb.
2. Contact and residual	Broadway star + PDM	0.265 kg 2.0 L	80	Cleavers, chickweed, charlock, marigold, pansy, groundsel, fumitory, hempnettle, deadnettle, speedwell, wild oats, AMG, vol osr, brome. Add adjuvant eg. Torpedo for best results
3. Late season control (spring)	Pacifica	400g	60	Brome, wild oats, AMG, vol osr, chickweed, charlock, deadnettle, groundsel. Mix restrictions

Autumn BYDV management in 2016

Crop	BYDV risk	Control Actions	Comments
Sept drilled winter cereals	High	1. Seed treatment Or Apply pyrethroid* at 2/3 leaf stage Followed by: 2. Pyrethroid* in early November	Even when aphid and virus occurrence high, NO benefit from extra sprays Late spraying of previously unsprayed crops can be beneficial when virus is widespread
Mid Oct drilled winter cereals	Medium to High	Seed Treatment Or Pyrethroid* 1 st week Nov (no later/second spray needed)	Late spraying of previously unsprayed crops can be beneficial when virus is widespread
Winter cereals emerging after end Nov	V. low	No treatment necessary (except in mild winters when aphids are plentiful)	

*where pyrethroid fails, consider Dimethoate (wheat only)